

etc. Biological samples also include cells grown in culture in vitro. A cell may be a cell of a tissue biopsy, scrape or lavage or cells.

[0138] The method described above finds particular utility in examining population of cells from body fluids or dissociated tissue using panels of antibodies. In some cases, blood cancer may be diagnosed based on detection of markers in a blood sample using the subject method. Exemplary blood cancer markers include: CD3, CD7, CD20, CD34, CD45, CD56, CD117, MPO, PAX-5, and TdT (acute leukemia); BCL-2, c-MYC, Ki-67 (Burkitt vs. DLBC lymphoma); BOB-1, BCL-6, CD3, CD10, CD15, CD20, CD30, CD45 LCA, CD79a, MUM1, OCT-2, PAX-5, and EBER ISH (Hodgkin vs. NHL); BCL-2, BCL-6, CD3, CD4, CD5, CD7, CD8, CD10, CD15, CD20, CD30, CD79a, CD138, cyclin D1, Ki67, MUM1, PAX-5, TdT, and EBER ISH (lymphoma); CD30, CD45, CD68, CD117, pan-keratin, MPO, S100, and synaptophysin (Lymphoma vs. Carcinoma); ALK1, CD2, CD3, CD4, CD5, CD7, CD8, CD10, CD20, CD21, CD30, CD56, TdT, and EBER ISH (T-Cell Lymphoma); BCL-2, BCL-6, CD3, CD5, CD10, CD20, CD23, CD43, cyclin D1, and Ki-67 (Lymphoma vs. Reactive Hyperplasia); and CD3, CD8, granzyme B, and TIA-1 (T-LGL Leukemia).

[0139] In some embodiments, the method may involve obtaining data as described above (an electronic form of which may have been forwarded from a remote location) and may be analyzed by a doctor or other medical professional to determine whether a patient has abnormal cells (e.g., cancerous cells) or which type of abnormal cells are present. The data may be used as a diagnostic to determine whether the subject has a disease or condition, e.g., a cancer. In certain embodiments, the method may be used to determine the stage of a cancer, to identify metastasized cells, or to monitor a patient's response to a treatment, for example.

[0140] In any embodiment, data can be forwarded to a "remote location", where "remote location," means a location other than the location at which the data is examined. For example, a remote location could be another location (e.g., office, lab, etc.) in the same city, another location in a different city, another location in a different state, another location in a different country, etc. As such, when one item is indicated as being "remote" from another, what is meant is that the two items can be in the same room but separated, or at least in different rooms or different buildings, and can be at least one mile, ten miles, or at least one hundred miles apart. "Communicating" information references transmitting the data representing that information as electrical signals over a suitable communication channel (e.g., a private or public network). "Forwarding" an item refers to any means of getting that item from one location to the next, whether by physically transporting that item or otherwise (where that is possible) and includes, at least in the case of data, physically transporting a medium carrying the data or communicating the data. Examples of communicating media include radio or infra-red transmission channels as well as a network connection to another computer or networked device, and the internet or including email transmissions and information recorded on websites and the like. In certain embodiments, the data may be analyzed by an MD or other qualified medical professional, and a report based on the results of the analysis of the data may be forwarded to the patient from which the sample was obtained.

[0141] In certain cases, the portions of the cells remaining on the substrate after being analyzed by SIMS may be recovered selectively to further analyze cells of interest, as described above. Exemplary analyses that may be performed on the recovered cells include sequencing (e.g., next generation sequencing) of nucleic acids, proteomic and metabolomics analyses, fluorescence imaging, Raman spectroscopy, nuclear magnetic resonance, etc. The further analysis may be used to confirm the results of the SIMS analysis, to obtain genomic, proteomic, etc., information, or to otherwise further characterize the biological properties of the cells of interest recovered based on the SIMS analysis.

[0142] In some cases, the method may be employed in a variety of diagnostic, drug discovery, and research applications that include, but are not limited to, diagnosis or monitoring of a disease or condition (where the abundance and/or localization of one or more mass tags identifies a marker for the disease or condition), discovery of drug targets (where the a marker associated with cells in the data may be targeted for drug therapy), drug screening (where the effects of a drug are monitored by the abundance and/or localization of one or more mass tags), determining drug susceptibility (where drug susceptibility is associated with a marker) and basic research (where it is desirable to measure the differences between cells in a sample).

[0143] In certain embodiments, two different samples may be compared using the above method. The different samples may be composed of an "experimental" sample, i.e., a sample of interest, and a "control" sample to which the experimental sample may be compared. In many embodiments, the different samples are pairs of cell types or fractions thereof, one cell type being a cell type of interest, e.g., an abnormal cell, and the other a control, e.g., normal, cell. If two fractions of cells are compared, the fractions are usually the same fraction from each of the two cells. In certain embodiments, however, two fractions of the same cell may be compared. Exemplary cell type pairs include, for example, cells isolated from a tissue biopsy (e.g., from a tissue having a disease such as colon, breast, prostate, lung, skin cancer, or infected with a pathogen etc.) and normal cells from the same tissue, usually from the same patient; cells grown in tissue culture that are immortal (e.g., cells with a proliferative mutation or an immortalizing transgene), infected with a pathogen, or treated (e.g., with environmental or chemical agents such as peptides, hormones, altered temperature, growth condition, physical stress, cellular transformation, etc.), and a normal cell (e.g., a cell that is otherwise identical to the experimental cell except that it is not immortal, infected, or treated, etc.); a cell isolated from a mammal with a cancer, a disease, a geriatric mammal, or a mammal exposed to a condition, and a cell from a mammal of the same species, preferably from the same family, that is healthy or young; and differentiated cells and non-differentiated cells from the same mammal (e.g., one cell being the progenitor of the other in a mammal, for example). In one embodiment, cells of different types, e.g., neuronal and non-neuronal cells, or cells of different status (e.g., before and after a stimulus on the cells) may be employed. In another embodiment of the invention, the experimental material is cells susceptible to infection by a pathogen such as a virus, e.g., human immunodeficiency virus (HIV), etc., and the control material is cells resistant to infection by the